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# USSR Report

TRANSPORTATION

No. 68



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AIR

#### ARTICLE DESCRIBES AN-28

Moscow KRYL'YA RODINY in Russian No 10, Oct 81 (signed to press 14 Sep 81)  
pp 18-19

[Article by O. Bogdanov, design engineer, candidate of engineering sciences:  
"An 'All-Terrain' Airplane"]

[Text] When we hear the term "all-terrain," we imagine a vehicle that serves local transportation needs, which travels confidently over trackless terrain and ice, through the muddy season and over snowdrifts. For airplanes on local air routes the term "all-terrain" signifies simple tastes when it comes to base facilities and conditions, minimal dependence on climate, season and weather, and maximum reliability.

Many years of operating experience of the subdivisions of Aeroflot serving local air routes has shown that they need not merely an "all-terrain" airplane, but an airplane distinguished by its versatility; after all, in addition to carrying passengers and cargo, it must perform many other assignments: flying off to provide emergency medical aid and for aerial photographic surveying, to patrol timber tracts, to provide supporting services for various field expeditions, to participate in geological explorations, and so on. But this still is not all: the pilots working on local air routes are usually young. That means that a new airplane should display maximum stability, simplicity and ease in its handling. And finally, the new airplane should be unconditionally more economical than its predecessors in this class.

Great efforts, resourcefulness and bold engineering conceptions were required of the design bureau's staff in order to develop and build an airplane that would meet those requirements to the highest degree. It is hard to believe, but it is so: almost as much creative energy had to be expended to create the little AN-28 for local air routes as to design the huge AN-22. The flight test showed that the airplane was successful. To take off or land it needs only 550 meters of unpaved surface. Carrying 17 passengers it covers a distance of 600 km at an average speed of 350 km/hr. The cost per passenger-kilometer under those conditions is 30 percent lower than for the very economical AN-2.

In design the AN-28 is a high-wing monoplane with bracing struts and fixed undercarriage. It is of metal construction. The power plant consists of two TBD-10B turboprop engines each with a capacity of 940 effective horsepower.



Should one engine fail in flight, the AN-28 continues to fly and gain altitude at a rate of climb up to 3.5 meters per second. The complex of the flying control and radionavigation equipment and the anti-icing system guarantee regularity even when weather conditions are problematical and either by day or night. The two-spar monocoque wing with an area of 39.8 square meters and with a profile of relatively high thickness ratio and camber is equipped with double-slotted flaps and suspended ailerons. Their use makes it possible for the pilot to gain altitude and descend on a very steep trajectory, which is indispensable at small airfields surrounded by nearby obstacles.

The use of glide interceptors increases even more the accuracy of the landing approach and reduces the length of the landing run.

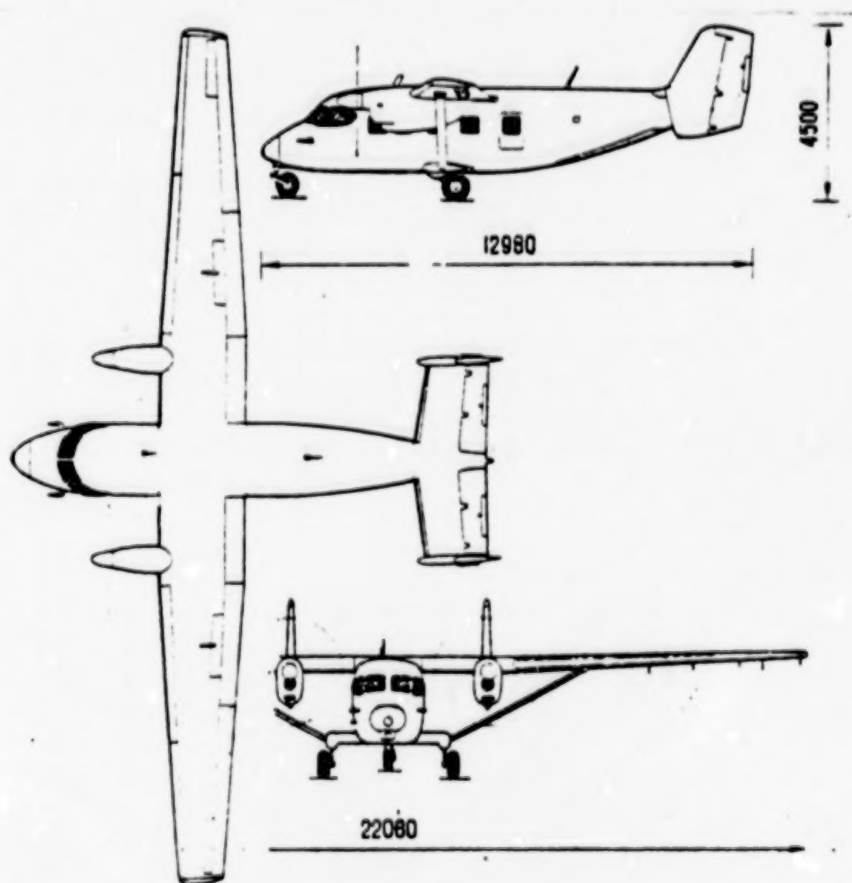
Many airfields on local air routes do not have concrete runways. At some the ground is soft, and in the muddy season in the spring and fall they become boggy. For aircraft with retractable landing gear takeoffs from such fields present a definite hazard: because the wet mud and water gets into the niches of the wheels, they could freeze in the air and refuse to be lowered for landing. In order to prevent suspension of flights on routes with such airfields in those seasons, the general designer decided to use a fixed tricycle undercarriage and wide-track low-pressure tires. On them the airplane confidently takes off from surfaces with specific soil firmness of only 3-3.5 kg per square centimeter, from a wet runway or even from a "boggy" runway. A certain loss of the airplane's cruising speed is offset by the increased flight regularity and safety.

The AN-28's cabin was designed so as to take into account the peculiarities of local air routes. If necessary, it can be converted in a few minutes at any airfield from a comfortable and warm passenger cabin (with comfortable seats and individual ventilation) to a cargo hold with a traveling crane that can lift up to 500 kg. After the passengers leave the aircraft, the seats are folded up to the side, and containers up to 2 x 2.4 meters or any piece of freight up to 7 meters long can be placed in the cabin. It is thus possible to deliver passengers in one direction and to return with cargo, which, of course, considerably increases the efficiency of the airplane's use. The AN-28 does not have the traditional side passenger door. Embarkation and disembarkation, and also loading and unloading are done through the hatch door in the rear of the plane which drops down.

In developing the AN-28 the designers paid particular attention to measures ensuring flight safety. Flight at high angles of attack and loss of speed do not cause the airplane to stall because of its well-thought-out design and the effect of the automatic leading-edge flaps. In such a case the AN-28 itself begins to drop its nose, speed is regained, and control is preserved relative to all axes. It is not hazardous for the AN-28 even when one engine fails. Thanks to the effect of automatic reduction of the angle of bank, developed in our own experimental design bureau and used for the first time in aircraft construction, the angular velocity of the airplane's bank or roll increases slowly. This device is protected by an author's certificate and has been patented in the United States and France. With the vertical tail unit with its two vertical fins so located as to receive the streams from the propellers, even the one vertical fin

opposite to the engine that has failed is effective enough to maintain course even at low speeds.

In the autumn and winter subdivisions maintaining local air routes not uncommonly encounter the unpleasant phenomenon of icing. Trips have to be canceled or delayed because of it. Even if the aircraft spends a short time in an icing zone the ice quickly builds up on the airplane's load-carrying surfaces, and that affects stability and handling. The pilot is compelled to terminate the flight to prevent it from getting worse. Measures of combating even this natural phenomenon were also provided for in developing the AN-28. Heavy-duty hot-air anti-icers have been installed in the wing and tail assembly of the AN-28. Aside from this, the slotted design of the wing and tail assembly in and of itself substantially reduces the harmful effect of ice buildup on the plane's aerodynamics. This configurational method of protection against icing is a creative discovery of the staff of our experimental design bureau. It is also protected by an author's certificate and has been patented abroad.



Aviation equipment of the 11th Five-Year Plan

Flight safety and effectiveness depend not only on the reliability of an aircraft's design, and on its equipment, but above all on the work of the crew. Again the staff of the experimental design bureau has done everything possible

to facilitate the work of the pilots of the AN-28. Their cockpit is comfortable in every respect. The side windows of the windscreen are markedly convex in order to improve the field of vision. The location, form and colors of the control levers and special safety devices that prevent the control components from being switched on or off inadvertently or erroneously make it easier to fly the airplane in both a normal and also in a problematical situation.

Prolonged and comprehensive tests of the new plane for local routes have now been completed. Our AN-28 passed them with flying colors.

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AIR

# REVIEW OF BUGAYEV BOOK ON AEROFLOT

Moscow KRASNAYA ZVEZDA in Russian 20 Oct 81 p 2

[Review by Yu. Ostapenko of book "Aeroflot ot s"yezda k s"yezdu" [Aeroflot From Congress to Congress] by B. Bugayev, Izdatel'stvo "Transport", 1981, 112 pages, price 40 kopecks]

[Text] On the jacket of the book is a silhouette of a giant silver airliner, the Il-86 airbus, which personifies the capability of Soviet civil aviation at the present time. And its every page tells what Aeroflot, the world's largest airline, is like today. This account is all the more interesting because it was written by the man who heads the industry, the chief marshal of aviation, B. Bugayev, minister of civil aviation.

The author shows how thanks to the everyday concern of the party and government Aeroflot has carried on its wings the bulk of passenger traffic: 3,600 of the country's cities have been connected by the network of domestic airlines, and the routes of airliners bearing the image of the country's red flag on the vertical fin have already been established to 86 countries of the world. During the last 5-year period half a billion persons used the services of air transportation. This allows us to say that Soviet civil aviation has become one of the important branches of the country's economy.

But carrying passengers is only one of the forms of activity of the civil aviation industry. Airplanes and helicopters are energetically assisting the workers of various sectors of the economy. The author speaks in detail about the participation of aviation personnel in petroleum and gas exploration and production in Tyumen', in building gas and petroleum pipelines and long-distance power transmission lines, one-of-a-kind projects like television towers, ventilating units, and so on. Patrolling the forests, aerial photographic surveying, guiding ships on the Northern Sea Route, ice reconnaissance, aiding fishing fleets, delivering food and equipment to geologists, scientists.... One cannot but tell about the aid to farmers in raising their crops. More than 100 million hectares of fields were treated from the air by the crews of the agricultural air force in just the past year. This is a weighty contribution by the winged farmers to fulfillment of the food program outlined by the 26th party congress.

The author speaks with great warmth about the branch's principal resource--the people who work in the subdivisions of the Ministry of Civil Aviation. And the

branch has something to be proud of: working in its ranks are more than 200 Heroes of the Soviet Union, Heroes of Soviet Labor, and winners of the Lenin and State prizes, as well as more than 300 distinguished pilots of the USSR and distinguished navigators of the USSR. "Civil aviation," B. Bugayev writes, "has never had a shortage of talented and courageous people devoted to their profession, modest and honest workers. They are there in every administration, enterprise, on every ship, in every work team, and in every aviation subdivision." It is they, these modest workers, who rely in their work on the glorious traditions of Soviet aviation and on the experience of the older generations, who comprise Aeroflot's treasury of gold.

The book has seven chapters which relate in detail all aspects of the activity of Aeroflot. The last chapter--"New Horizons," which tells about the future of the branch, about new routes which will be opened, and about the new equipment which will be furnished to Aeroflot, is an especially interesting one.

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## MOTOR VEHICLE

### TEST OF COST ACCOUNTING IN AUTOMOTIVE TRANSPORT PRAISED

Moscow FINANSY SSSR in Russian No 10, Oct 81 (signed to press 11 Sep 81) pp 27-30

[Article by A. K. Birkin, candidate of economic sciences: "On Strengthening the Influence of the Management Mechanism in Automotive Transport"]

[Text] An analysis of reporting data indicates that an experiment to improve planning, economic incentives and control in common-carrier automotive transport that was conducted in the Latvian, Belorussian and Kazakh SSR's has justified itself.

The requirements of branches of the economy and of the populace for haulage are being satisfied better. Effectiveness of the use of productive capital, primarily of rolling stock, equipment and mechanisms, has been raised. A reduction in prime costs for hauling has been achieved, and the pace of growth in labor productivity has been accelerated.

In the republics where the experiment was conducted, the mechanism for management of the automotive transport branch has been put in order. Here they have converted to the two-level structure of management and have created associations, which include small enterprises that exercise the rights of production units.

The five-year plan with breakdown of tasks by year, which is confirmed by the republic's council of ministers, has become the basis for planning operating and economic activity. Simultaneously, economic standards are established, also based upon the five-year period with breakdown by year. These are standards for deductions from profit that is at the disposal of the ministry of automotive transport and a standard for wage expenditures per ruble of income for all types of activity, the standard for deductions into the state budget being established as percentages of balance-sheet profit.

The measures taken have yielded substantial economic benefit. The pace of increase in the amount of hauling in tons and in freight turnover exceeded by far the average level for the country. Profit rose accordingly. While for the Soviet Union as a whole, during the period being compared growth in profit for automotive transport was 103.6 percent, it was 115.7 percent for Belorussia, 147.2 percent for Kazakhstan and 115.8 percent for Latvia. Nor did matters go any worse for other indicators. All this will enable a conclusion to be drawn about the desirability of the work that has been accomplished and the positive value of the experience obtained.

Freight hauling by common-carrier automotive transport of the Kazakh SSR rose during the 10th Five-Year Plan by 56 percent versus the planned 42 percent. Hauling by bus increased 28 percent. The ministry's share of freight turnover in transport operations performed within the republic increased from 34 to 41 percent. The amount of hauling by tandem truck-and-trailer units was brought up to 56 percent. Buses became the basic type of passenger transport. Suburban and interurban routes covered all cities and settlements, 98 percent of the sovkhozes and kolkhozes, and more than 93 percent of the villages, including those of the Asiatic type. The total length of the scheduled system reached 430,000 kilometers. The rise in automotive transport operating effectiveness was inseparably linked with further improvement of the management mechanism. By the fifth year the ministry was operating under the new management conditions. The system for planning and economic incentives was restructured and the first phase of an automated system for the branch, the equipment base for which is formed by 15 computer centers equipped with 30 electronic computers, was introduced.

In the Belorussian SSR, common-carrier automotive transport, although it comprises about 20 percent of the republic's motor-vehicle fleet, hauled more than 50 percent of all freight for the republic's economy. In 1980, 1.5 million tons of freight above the plan were shipped, and 9,800 tires as well as 2.5 percent of the automotive fuel, were saved. Special attention is being paid to the quality of service for enterprises and organizations and to providing haulage for the entire spectrum of freight. Intercity routes are being developed at a rapid pace, relieving the railroads to a substantial degree. This haulage was 44.1 percent of the freight turnover. During the 10th Five-Year Plan many bus routes were opened up and new bus stations and filling stations were put into operation. Today 32.6 percent of all truck fleet drivers work under brigade contract. In passenger hauling 58.3 percent of the bus drivers and 98.1 percent of the cab drivers are employed under this method. A centralized system for organizing and managing the technical servicing and repair of motor vehicles has replaced organization of the work into sections by type of vehicle.

The experiment was begun earlier in the Latvian SSR than in the other republics. Common-carrier automotive transport had more than 40 percent of the freight turnover, while its share of vehicles was 20 percent. The outstripping development of automotive haulage here became possible thanks to improvement of the management mechanism, well-thought out organization of work, and the promotion of socialist competition. Of all brigades, 27.4 percent are working under the contract method. During the last five-year plan the volume of containerized and packaged freight doubled. Haulage volume rose 15.2 percent, freight turnover 25.4 percent, during the 10th Five-Year Plan. Passenger busing increased 18.8 percent, passenger turnover 21 percent. Minavtotrans [Ministry of Automotive Transport] converted to cost accounting, and the two-level system of management was introduced.

The Accountability Report of the CPSU Central Committee to the 26th Party Congress pointed to the need to continue to improve management at the association and enterprise levels, to expand their self-sufficiency and rights, and to intensify the responsibility of supervisors. The organization of haulage is to be improved and the effect of the economic mechanism on the final results of activity is to be intensified in automotive transport.

Especially to be noted is the major significance for automotive transport of CPSU Central Committee and USSR Council of Ministers decree No 695 of 12 July 1979. The



issuance of this decree laid the beginning for a new stage in the improvement of methods for supervision of the branch. Gosplan and USSR Minfin [Ministry of Finance], together with transport and other ministries and agencies, worked out a draft of a new procedure for planning transport work, in accordance with which standard practice instructions will be issued. Taking into account the requirement of other branches of material production, as well as those of the populace, major attention is being paid to an in-kind mix of indicators as the bases for planning transport work. The recommendations about extending to automotive and other forms of transport the procedure for making up long-term plans, including five-year plans with breakdown by year, and about taking measures to speed up the introduction of productive capacity and facilities into operation, to raise capital investment effectiveness, and so on, should also be complied with.

Automotive transport supports interindustry ties, so its work can be combined with the activity of other spheres of production only by using indicators that can characterize final results. The mission of automotive transport is to deliver freight, so, when planning haulage, an indicator of the amount of freight in tons and of the distance in kilometers should be applied. This, naturally, should be the basis for annual and five-year plans. Freight haulage is to be approved in a consolidated mix, which will, as a rule, be broken down into detail during current planning.

Under the existing method of planning, calculations for all types of haulage are made with use of the mandated indicator, "freight turnover in ton-kilometers." Without this indicator, it is impossible to compute requirements in kind or in monetary terms for the plan. This relates to the supplying of rolling stock, fuel, spare parts and other items. And without it the expenditures and income of an activity cannot be determined. Rates for hauling freight and passengers also are constructed on the basis of computation by the kilometer, not to mention such an important indicator as the prime cost of hauling.

The weak aspects of the "freight turnover" indicator are perceived in the fact that it does not reflect society's requirements for the final results of the transport branch's operations. Moreover, it is impossible to relate it to the nature of the output of the branch of the economy being served. If one cannot agree with the first argument, since freight turnover reflects precisely the final result of transport operations, then it is difficult to argue against the second. It would seem that the way out of the situation consists in retaining two of the approved indicators--"tons" and "freight turnover." The inclusion of "freight turnover" in the plan will restrict the expenditures of activities, while the elimination of the ton-kilometer indicator will increase the possibility of inflated reports.

The remaining indicators of the five-year plan do not provoke disagreements. Taking the experience of the experimental motor pools as a whole into consideration, their system can be as follows: the total volume of freight haulage in tons and freight turnover; passenger-turnover volume; growth in labor productivity, calculated in in-kind indicators; the total wage fund or its standard per unit of output; standards for forming funds for material incentives for social and cultural measures, housing construction, and the development of production; total amount of income; total amount of profit; the introduction of fixed production capital into operation; the amount of capital investment, including construction and installing work; the standard for forming the single fund for the development of science and technology (for ministries); the volume of delivery of rolling stock (trucks and buses); and tasks for average reduction in the norms for fuel consumption and for prime costs as a whole.



The annual goals are not a mechanical repetition of the five-year plans. They can differ in their amounts from those adopted in the five-year plan, but they should not fall below them. It is desirable, therefore, that the sovmins [councils of ministers] of the Union republics approve in annual plans for economic and social development indicators that concretize or in some instances refine the tasks set for the corresponding year of the five-year plan.

Among the above-enumerated indicators, there are none that would give an incentive for quality of haulage: for timeliness of delivery and preservation of the freight. They must be coordinated with the material incentives for automotive transport workers. Complaints often come from clients about the refusal of automotive transport workers to haul lightweight freight or to make short runs. This occurs because of imperfection of the system of rates for haulage. Also in need of review are various indicators for motor-vehicle utilization.

The measures named do not exhaust those which, in our opinion, should be executed to achieve full and high-quality service for all enterprises and organizations of the national economy.

Taking into account the positive result of the experiments that were conducted in the RSFSR in 1980, the statute about the automotive transport production association (or combine) with the extension of its operation to all such associations, regardless of agency subordination, was approved. Such an association is a single economic and production complex, which is made up of automotive-transport, automotive-repair and other production units. The latter are not juridical persons and operation of the statute of socialist state production enterprises has not been extended to them. In the necessary cases, various self-sufficient enterprises and organizations that enjoy the rights called for by the statute on enterprises can be subordinated to the association. In this case, the association emerges in its relationship with them as the superior organ, and it can completely or partially centralize the execution of their various production and economic functions. It seems to us that it is desirable that the Union republics extend the operation of this statute about the automotive-transport production association.

It is known that the automotive transport ministries do not now possess the current economic self-sufficiency that the associations have. Nevertheless, there are cost-accounting elements in the ministries. Experience testifies to the importance of expanding the ministries' cost-accounting rights. Full cost accounting, to which Union-republic automotive transport ministries have transferred by way of experiment, has been supported by creation of the appropriate conditions. In order to intensify the role of economic methods in the supervision of enterprises and associations the following centralized funds were established within the ministries: for the financing of capital investment; for scientific research; for the mastery of new equipment and output; for expenses for training personnel; and for material incentives and the awarding of bonuses in republic socialist competition, as well as for reserves: for extending financial assistance to associations and enterprises and for regulating mutual settlements with the budget and change in standards for in-house working capital; for the wage fund; for supply and equipment resources (including rolling stock and credit); and for amortization deductions, intended for overhaul.

Each of the enumerated funds and reserves has a specific purpose that will enable the ministry to solve responsively the problems of managing a production complex on

the Union-republic scale. It should be noted that the creation of centralized funds and reserves should not affect budget interests. The total of the funds, calculated according to the standards for associations, enterprises and ministries, cannot exceed that calculated according to the standards, taking into account the results of the ministry's work as a whole.

One of the main prerequisites for introducing cost accounting in automotive transport should be a rise in exactingness toward the quality of the drafts of the five-year and annual plans that are developed. Stability must be assured in the annual and quarterly plans approved by production associations (or enterprises), with no plans revisions permitted in the direction of a reduction below the level of actual fulfillment. Responsibility for such revisions should be established.

In order to provide for timely settlements for hauling, it is desirable, in accordance with industry's example, when payment is due and the client's funds are short, to reimburse the accounts payable that have been accepted by the client through Gosbank or Stroybank loans, with the client assuming indebtedness for it, with repayment thereof within 60 days and the exaction of 5 percent interest. Upon expiration of the indicated period, the granting of credit will be extended with the imposition of increased interest.

The development of a system of economic norms for planning and of incentives for production, including standards for the distribution of profit, has acquired great significance. Such standards normally should be introduced during the conversion of automotive transport organizations to the new terms for management. We have in mind the establishment of an incentives procedure for making payments into the budget. For example, if the profit plan is not met, payments into the budget are made in the full amount through a corresponding reduction in the share that is left at the ministry's disposal. Said method will enable the conclusion to be drawn that the higher the effectiveness of use of economic levers, the more valid the financing plans of the ministries and the more stable the performance indicators. Improvement of economic levers and stimuli should also help in finding reserves for raising production effectiveness at the plan-development stage. This should be reflected in all standard-procedures documentation for planning.

Profit that remains at the disposal of the automotive transport ministry is determined in accordance with approved standards, which are established as percentages of balance-sheet profit, based upon the totals for income and expenditures that are planned for the five-year period (with breakdown of goals by year), which are computed in the financial plan. In determining the part of the profit that is left at the disposal of the association, first of all the goals at which it should be aimed are established. After that, primarily in-house sources of the enterprises are considered. Among the planned expenditures for which profit can be aimed are: payment of interest on Gosbank and USSR Stroybank credits, the forming of economic incentive funds, the financing of capital investment and reimbursement of long-term credits, the financing of scientific research, the forming of a reserve fund for extending financial help to subordinate enterprises, the forming of a reserve fund for awarding bonuses to enterprises and organizations in the republic's socialist competition, and other planned expenditures.

Under the standard distribution of profit, the ministry of automotive transport guarantees fullness of payments into the budget if the associations for some reason do not cope with such payments. This is done through the reserve fund that is

formed at the ministry. The desirability of creating such a reserve has been confirmed by operating practice under the new conditions. Indebtedness for Gosbank loans has been reduced severalfold.

The most immediate tasks are the development of a unified procedure for converting automotive transport ministries to cost-accounting methods of activity. During the experiment good results were obtained, but the procedures that were used need refinement. Because of this, it is desirable to touch upon various questions that are not properly reflected in the existing statutes.

An acceleration of scientific and technical progress is of very great significance for automotive transport and for expansion of the output of products by the production associations (or enterprises). For these purposes and in accordance with the example of other branches of the economy, it is desirable during the 11th Five-Year Plan to convert scientific-research, design-development and technological organizations and experimental enterprises to the cost-accounting system for organizing the work to create, master and introduce new equipment, based upon schedule-type orders (or agreements). These should specify the final results (including the benefit to the economy), the executors, and the periods for execution of the work at all stages, right up to introduction of the results into production activity, and also the required material resources and the amounts and sources of financing and incentives. It is necessary to create in automotive-transport ministries and agencies a single fund for developing science and technology for the financing of scientific research, experimental design development and the reimbursement of expenditures connected with the development and mastery of new technologies and with introduction of the scientific organization of work, and also for covering additional expenditures for improving service for the national economy and the populace and expenditures during the first years of the introduction of new technological processes. This fund should be formed through deductions from the planned profit of associations (or enterprises) in accordance with the standard established in the five-year plan (with breakdown by year) in percents of the total amount of income, including the volume of commodity output of automotive transport's industrial-type enterprises. The automotive transport ministries must be granted the right to place part of this fund at the disposal of associations (or enterprises), to create scientific-research and design-development organization incentive funds for social and cultural measures, housing construction and the development of the organizations.

In our opinion, Gosbank and USSR Srobybank should grant credit: to automotive transport ministries and agencies for work that is financed through resources of the single fund for the development of science and technology, where the input to this fund and the amounts expended from it do not coincide during the year; to branch-of-industry production and regional associations (or enterprises) in payment for work financed through the single fund for the development of science and technology, if they are carried out in a shorter time than called for by the plan; for the accomplishment of highly effective measures for developing science and technology not called for by the plan, with reimbursement of credit and interest on the credit for a period of 2 years from the date of issuance through the fund for developing science and technology. The indicated credit must be granted under the guarantee of the automotive transport ministries.

It is desirable to introduce into automotive-transport production associations (or enterprises) one-time bonuses for the execution of especially important and highly

effective work, and also for the creation and mastery of basically new technological processes. They must be paid through resources of the single fund for developing science and technology.

It should be borne in mind that the development and introduction of more improved indicators for planning automotive transport work under the new conditions still does not, in and of itself, solve the problems of raising work effectiveness. It is necessary also to execute a set of measures to use internal economic reserves for improving the organization of haulage. I have in mind the improvement of hauling technology, the introduction of new methods and systems for the timely delivery of freight, and the development of hauling in containers and bundles. Rolling stock turnaround must be accelerated, the potential of load-lifting machinery must be used more completely, the time taken for delivery must be reduced, and monitoring the preservation of freight must be intensified. The sophistication of service for passengers on buses must be raised, the system for selling tickets must be improved, and schedules for departures and arrivals must be observed more strictly. It is necessary also to convert to a complete freight-forwarding service by common-carrier automotive transport from railroad yards and maritime and river ports (or docks) for all freight shippers and receivers. All this will enable the effect of the cost-accounting mechanism on automotive transport operations to be intensified.

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## MOTOR VEHICLE

### AZERBAIJAN SETS NEW RULES FOR CAR BUYING, RESALE, USE BY NONOWNERS

Baku BAKINSKIY RABOCHIY in Russian 28 Oct 81 p 2

[Article: "New Regulations for the Sale of Private Cars"]

[Text] Official information.

With a view to eliminating deficiencies in the matter of sales of automobiles to citizens that engender conditions that promote speculation, traffic accidents and other negative phenomena, the Azerbaijan SSR Council of Ministers has approved new regulations for the preparation of car-purchase waiting lists and for the distribution, sale and use of cars for private use. They go into effect 1 January 1982.

The new rules require that citizens who desire to acquire cars for their own use be placed on lists as follows:

blue-collar and white-collar workers--at the place of work, by joint decision of the administration and the fabzavmestkom [factory, plant or local committee];

nonworking pensioners--at the last place of work, regardless of the length of service at that organization, by joint decision of the administration and the fabzavmestkom;

collective farm members and blue-collar and white-collar workers of sovkhozes--at the ispolkom of the soviet of people's deputies of the rayon in which the kolkhoz or sovkhoz is located--by decision of the ispolkom; and

nonworking disabled persons, veterans of the Great Patriotic War and disabled workers--at the ispolkom of the place of residence.

People who have at least 3 years of service at a given enterprise, institution, organization or kolkhoz can be put on the car-purchase waiting list at the place of work.

The new rules prohibit persons from being placed on a car-purchase waiting list if:

they have not reached the age of 18;

they are students of vuzes or pupils of secondary specialized education institutions (except for those taking correspondence or evening courses),



they themselves, or members of the family residing with them, have a car in their personal possession, except for a car with manual control that was acquired in the established procedure through social security organs; and

they themselves, or members of the family residing with them, have previously acquired a car for personal possession, unless the following periods have elapsed since the date of acquisition: 8 years for a Volga, 5 years for a Zhiguli, 4 years for a Moskvich and 3 years for a Zaporozhets.

The same periods are applied to cars that are comparable with the indicated brands of cars. The fact of the existence of the car and the date of its acquisition are established by report of the republic's GAI [State Motor-Vehicle Inspectorate].

Lists of precedence are presented for the examination and approval of the rayon and city ispolkom. Lists approved by an ispolkom are posted for public information.

Along with the procedure for placing citizens on the list, the new rules also regulate strictly the procedure for sale of cars to them. It is required that no later than 10 days after receiving quotas of cars, the administrations of ministries, state committees, agencies, enterprises, institutions and organizations, jointly with fabzavmestkoms, make up a list of their blue-collar and white-collar workers from among those on the waiting list to whom cars allocated under the quota should be sold. In so doing, the precedence established on the list should be strictly adhered to, as should the right of Great Patriotic War veterans to precedence in acquiring a car. The list is discussed and approved at a general meeting of workers of the ministry, state committee, agency, enterprise, institution or organization and is presented for the ispolkom's examination.

This list, which is approved by the ispolkom, also is posted at the enterprise or organization or institution for public information. It is the basis for the store to sell cars to the people indicated on the list.

The sale of cars to citizens who comprise the list at the ispolkom--kolkhoz members, blue-collar and white-collar workers, nonworking disabled persons, Great Patriotic War veterans and disabled workers--is executed according to the lists prepared in the ispolkoms, with the observance of all the requirements of the indicated regulations.

Ministries, agencies, state committees, enterprises, institutions and organizations are required to present to the stores the lists approved by the ispolkom no later than 5 days after approval by the ispolkom.

Zhiguli cars are sold to the populace by specialized VAZ [Volgograd Motor-Vehicle Plant] automotive centers, other types of cars are sold by specialized state trading stores and Azerittifaka in the zones of their trading activity.

Responsibility for correctness in placing persons on the lists and for allocating cars to nonworking disabled persons, Great Patriotic War veterans and disabled workers has been vested in the supervisors of the appropriate ministries, state committees, agencies, enterprises, organizations, institutions and ispolkoms of rayon and city soviets of people's deputies.

Changes have also been introduced into the existing rules for the sale of cars on commission. It has been established that cars belonging to citizens will be received for sale by commission stores no earlier than 3 years from the day of the owner's acquisition of the car.

In exceptional cases (death or grave illness of the car owner), the right is given to ispolkoms of rayon and city soviets of workers' deputies to receive a car on commission earlier than the 3-year period.

An owner of a car or motorcycle does not have the right to indicate the buyer to whom he wants to sell the car or motorcycle that belongs to him.

For purposes of guidance in the proper procedure, the new rules restrict the categories of persons to whom a car can be transferred for temporary use.

It was established that citizens can transfer their cars for temporary use free of charge: to family members who are living with the car owner and who drive with him to the same activity--for a period of up to 3 years; or

to close relatives (father, mother, son, daughter, brother, sister, son-in-law, brother-in-law, fiancée, or grandson) who do not live with the car owner and do not drive with him to a common activity but who live in the same community--for a period of up to 1 year.

The regulations prohibit the transfer of a car for use to the indicated persons if they do not have the right to drive a car, or are students at full-time vuzes or pupils of full-time secondary special-education institutions, or have not reached the age of 18, or are not employed in socially useful work.

If a car owner departs on a foreign trip or for work in Far North regions at shock-work construction projects, and also when the car owner cannot himself drive the car for reasons of health or does not have a driver's rights, he can transfer the car for temporary use by the persons indicated above: for the duration of the trip or work period, but not for more than 3 years; during a period of sickness, but not for more than 1 year; or during the period of lack of a driver's rights, but for no more than 6 months.

The car is transferred on the basis of a notarized attestation of the agreement for use free of charge, which is made up at the place of residence of the car owner.

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CSO: 1829/56

## RAILROAD

### LONG-TERM SETTling OF FILLS ON SWAMPY SECTIONS OF THE BAM-TYNDALINE

Moscow TRANSPORTNOYE STROITEL'STVO in Russian No 10, Oct 81 pp 3-5

[Article by engineer G. P. Minaylov and Candidate of Technical Sciences V. V. Guletskiy (Tynda Permafrost Station)]

[Text] The settling of fills is one of the most common types of deformation of the railroads built in the permafrost regions. They are found both on the railroads which have been in operation for a long time and on the newly built lines.

There has been considerable unforeseen settling of various fills in the period following the construction and in the swampy sectors of the BAM [Baykal-Amur Mainline]-Tynda line.

The BAM-Tynda Railroad runs through territories characterized by a severely continental climate. The average yearly air temperature ranges from -4.5 degrees Celsius in the south to -6.5 degrees in the north. The amount of rainfall reaches 550-600 mm a year. Of this amount 80-90 percent falls in the warm time of the year. The average perennial depth of the snow cover does not exceed 15 centimeters in the southern part of the road but reaches 30 centimeters in the north.

The permafrost soils in the territory under study are found chiefly in the extremely humid sectors of the area and on the slopes of the northern exposition. Most widespread in this region are the goosefoot plants--vast swampy expanses which cover the valleys of the rivers and streams, the gentle slopes of the bald mountains, and the flat watersheds. The depth of the seasonal thawing of the swampy soils is .6-1.0 meters and the temperature of the permafrost layer at a depth of 10-15 meters ranges from -1.5 to -3.0 Celsius. The soils which form the upper part of the swamp at a depth of 3-5 meters are usually extremely icy and when they thaw come under settling category IV. On the seas there is widespread repeated formation of velny ice and other varieties of underground ice. In all, about 80 kilometers of the BAM-Tynda line fills are formed by soils settling in thawing; 15 kilometers of this are in territory with underground ice which forms at a depth of 0.8-1.2 meters from the level of the daytime surface.

The research carried out showed that the fills built up in the swampy sectors of the BAM-Tynda line have generated important changes in the historically evolved permafrost soil conditions. It was found that the basic factors which determine

the degree of disruption of the original permafrost ground condition under the fills and in the region under study are the height of the soils and the structure and orientation of the slopes in relation to the points of the compass. It is self-evident that what we have said is accurate in respect to the provision for normal operation of the draining ditches when there is no possibility of filtration of the surface of the water into the foundation soils and also when fills are lacking on the slopes and their base is largely blanketed with snow which recurs year after year.

In keeping with these conditions some very minor decrease of the natural depth of the stratification of the upper boundary of the permafrost rock takes place chiefly under the fills up to 1.5 meters in height. When the height increases to 1.5-2.0 meters, there is usually observed retention of the upper boundary of the frozen turf at the level of natural stratification; at a higher level (3-3.5 meters) there is a rise to the level of the daytime surface.

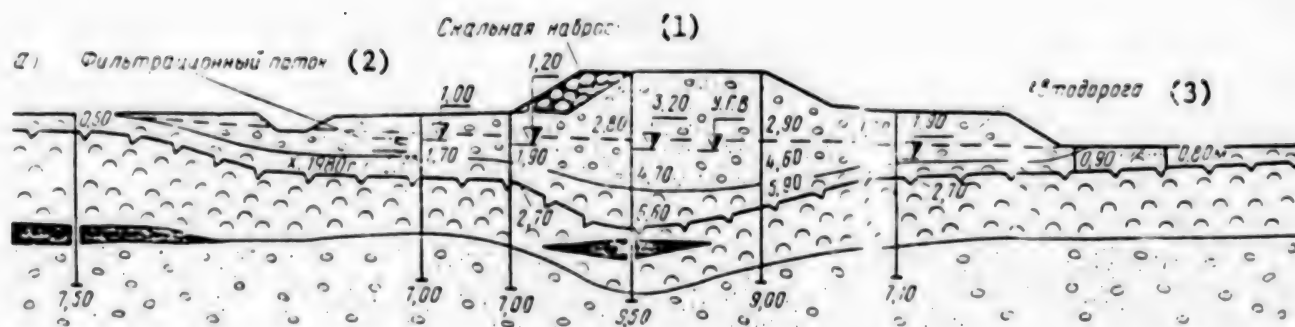
Further increase of the height of the fills entails intrusion of the upper border of the permafrost soils into the body of the soil bed. When the slopes of the fill are oriented latitudinally the contour of the surface of the ice mound which forms in the lower part of the body of the fill is symmetrical to the axis of the fill. In other orientation of the slopes the surface of the ice mound is assymetrical to the axis of the fill. Under the slopes of the northern, northwestern and northeastern expositions there is clearly observed a rise in the natural level of the frozen turf while under the slopes which are oriented to the south, the southeast and the southwest the upper border of the permafrost soils remains on the level of the natural bed or drops below it.

It should be noted that the fact of the rise and intrusion of the upper border of the permafrost rock into the body of the fills is considered by some specialists to be direct proof of the cooling effect of the fills on the original temperature regime of the soil beds. However, this premise by no means always conforms to the facts. It is undoubtedly valid in those instances when the regular average yearly temperature of the ground at the surface of all the elements of the fill is lower than the temperature of the permafrost rock at zero amplitude depth under natural conditions. The latter occurs chiefly in the regions of the Far North. In the swampy sections of the RAM route, where the abnormally low temperatures of the soils under natural conditions are caused chiefly by the considerable losses of heat by evaporation, the erection of fills from other soils, except for rock, has a warming effect on the original temperature regime of the permafrost rock. Moreover, the greater the warming effect the greater height of the fill and the greater the area it covers.

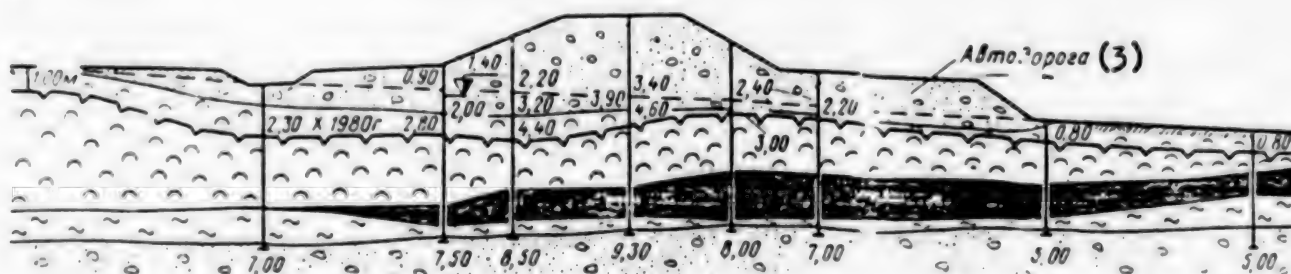




Drawing 1



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Drawing 2

Key:

1. Rock Fill
2. Filtration Flow
3. Motor Road



Prolonged observation of the formation of the temperature regime and the stabilization of the settling of the fills built in the swampy sectors of the BAM-Tynda line led us to conclude that when the height of the fills is up to 4 meters the settling caused by the formation of a new temperature regime in the soil foundation comes to an end in three-five years.

Seven years have gone by since the completion of construction of the BAM-Tynda Railroad and the settling of some fills in this area not only has not ceased but at a number of installations has taken on a progressive character. To determine the reasons for this phenomenon the Tynda frost station carried out a comprehensive study of the fills with the deformation. The results of the study showed that in the foundation of the deformed fills, despite the fact that their height exceeds 2 meters, there is an intensive thawing of the permafrost rock resulting from the warming effect of the filtration of the surface water which has accumulated in the lowering of the terrain on the mountainous side of the fills. The attempt to eliminate the lake of stagnant water by means of installations of centrifugal water berms did not produce the desired effect. The water centrifugal berms poured from the gravel and pebble soil, when their height is 0.5-0.7 meters, undergo considerable sagging in the first summer season; also, in the depression places lakes of water have formed (Drawing 1) and the filtration has led to the occurrence of new settling of sectors of track. The elimination of this settling back in the period of temporary operation of the road required considerable monetary funds and material resources. Nevertheless, we have not been able to thus eliminate some of the centers of settling before turning over the line for regular operation. These are primarily occurrences of settling of fills in the sectors of the road where there are the so-called "locked bosoms" covered with drainage soil. The engineering-geological cross sections of one of these fills was shown in Drawing 2.

This fill was erected in November-December 1974. From its lower side we built a motor road (height of the center of the soil bed 1.2-1.6 meters, width 7-8 meters) and from the upper side a berm 1 meter in height and 4 meters in width. In the first summer, despite the fact that this fill was poured in the winter and its height was wholly adequate for keeping the foundation soils in a frozen state, this fill underwent intensive settling. The reason for the settling was the thawing of the bedding soils under the warming action of the filtration of the surface water collecting from the mountainous side of the fill in a closed "bosom." The settling of the fill continued in the summer of 1976. To eliminate it, it was decided to cover the "bosom" with sand and gravel soil and for removal of the surface water to build a draining ditch in the fill soil. These measures were carried out in September 1976. The subsequent inspections indicated a low effectiveness for the measures taken to treat the fill. The settling has continued up to the present time and sometimes it has the character of sudden dips.

The engineering-geological studies concerning this fill enabled us to determine that the upper border of the permafrost rock in the sectors with filtration flows diminished by 2.5-3.0 meters as against the natural level of the frozen bed and in seven years the settling of the fill reached 1.5-2.0 meters (Drawing 2a). In the fill sectors which lack water filtration we observe a one-sided settling of the fill (Drawing 2b). There the edge of the upper slopes sinks 5-7 centimeters every year.

Well known is the unfavorable effect of filtration of the surface water on the stability of the fills in the permafrost regions.

In addition to the filtration of the water, a substantial effect on the soils in the base of the fills is also produced by the berms and other man-made covering poured on the slopes. The physical salient feature of this phenomenon is the following. Under the conditions of the BAM-Tynda Railroad the permafrost rock may exist chiefly in the quite humid sectors of the territory and also in the dry but shaded or snowless sectors. This is due to the very substantial effect on the reduced temperature of the soil surface under these conditions--the effect of consumption of heat in thawing; it is also due to solar radiation and the snow cover. Despite the comparatively low average yearly air temperature in the northern part of the BAM-Tynda Railroad and despite every kind of drying action in the territory, particularly the installation of man-made drainage soil covers which retain the natural snow cover--despite this, the process involves a considerable increase in the original temperature of the permafrost rock and in a number of instances a breakdown of the frozen state.

Many years of observation of the temperature regime of the fill depicted show that the derived average yearly temperature of the surface of the soil within the pocket and on the slope adjoining it has a positive significance that properly generates the formation of thawing basins under these elements of the fill.

The aforementioned example of a sizable post-construction settling of the fill proves that in the construction of the BAM the current widely practice use of drainage soils to cover the pockets and thermal karst lakes which form on the mountain side of the fill and the installation of centrifugal water berms not only does not prevent the development of continuous settling but in a number of cases actually intensifies the occurrence of this settling.

The most effective method of combatting the settling of the fills in this instance is the building of fills from graded rock soil on soil bed elements which have a favorable average yearly temperature of the surface. The capacity of the fills must be not less than 0.6-0.8 meters. The investigations of recent years established the fact that as a result of this and the presence of convective heat transfer in the rock soil, the derived average yearly temperature of the surface of the bedding soil is only 2-3 degrees Celsius more than the average yearly air temperature. The latter furthers not only the maintenance of the frozen state under the elements of the soil bed covered with rock soil but also furthers the lowering of the original temperature of the permafrost soils.

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## RAILROAD

### DIFFICULTIES ENCOUNTERED IN BUILDING BAM TUNNEL

Moscow MOSCOW NEWS in English No 52, 3-10 Jan 82 p 5

[Article by Anatoly Baranov]

[Text] The building of the Gran Sasso tunnel in Italy and the Rokko in Japan was rightly considered to be the most complicated in the world. But the Severo-Muysky tunnel on the Baikal-Amur Railway turned out to be even more complicated. Nobody has ever designed or built a tunnel like this one.

"The rocks are either hard enough to break steel instruments or soft enough to be punctured by a finger," says geologist Nikolai Potyomkin, who knows literally every rock formation in the vicinity. "Sometimes as much as 3,000 cubic metres of water gush through the prospecting drift in an hour. In such cases when you walk over the planks placed in-between tracks in the tunnel, a virtual river washes your boots and a heavy rain falls from the roof."

This year the tunnellers crossed hot springs and ran into vertical seams between huge granite slabs into which the mountains break during the movement of the Earth's crust. In such places the rocks turn into powder, the water washing

away the softened rocks and leaving caverns behind.

The ease with which the drifters made headway through such crevices did not quite lull their vigilance, but it did give them enough assurance to step up the speed of tunnelling.

"Our passage was easy, mere child's play," Ivan Slepko, section superintendent, says. "And, then, all of a sudden..."

Breakdowns are never planned. They always come as a surprise, even though they are not always accidental. When the tunnelling machine entered a crevice, which turned out to be five metres wide, everything started to crumble and ooze away. What was to be done? How could the hot water be stopped?

Specialists arrived from Moscow, Leningrad, Irkutsk and Novosibirsk. There were various proposals—to fortify the loose rocks by resins, silicate solutions and even to freeze them.

The drift's heading face turned into a kind of laboratory. Everything possible and impossible was tried.

It took six months to rectify the situation.

"Only volunteers worked in such conditions," Ivan Slepko said. "They worked according to a schedule approved by the trade union organization."

With hot water gushing, even the powerful lamps could hardly penetrate the thick mist. The temperature at the heading face was never below +38°C. Every 15-20 minutes people would go away to take a cold shower and have a rest.

They worked in shifts of four hours, but, of course, their wages remained the same.

A month later the tunnelling machine encountered another crevice, this time six metres wide. But it was crossed in less than a week. The experience, gained with such difficulty, had helped.

Now the tunnelling machine works at its former rate of up to three metres a day.

Severo-Muysky, the most complex railway tunnel in our country, is going deeper and deeper into the mountain every day. When completed, it will be over 15 km long.

Anatoly BARANOV

CSO: 1812/36

## OCEAN AND RIVER

### UTILIZATION OF SMALL RIVERS

Moscow RECHNOY TRANSPORT in Russian No 9, Sep 81 pp 23, 26

[Article by V. Buneyev, Novosibirsk Institute of Water Transport Engineers: "Utilization of Small Rivers in Obskoye Zapolyar'ye"]

[Text] The provision in the 11th Five-Year Plan for the further development of the oil and gas extraction industry will result in a significant increase in cargo shipments to that area. The almost completed Surgut-Urengoy railroad will be unable to satisfy fully the need for cargo shipments to the northern part of the Tyumenskaya Oblast. Accordingly, a significant amount of cargo will still have to be handled by the river fleet.

The small rivers of the Obskoye Zapolyar'ye are vital transportation links for the delivery of an enormous amount of national economic cargo to these areas. The largest proportion of shipments have been carried on the Nadym, Pur and Taz Rivers. This situation will continue in the future.

The potential for the growth of the cargo flow on the Nadym, Pur and Taz Rivers up to the year 1990 was studied at the Novosibirsk Institute of Water Transport Engineers. The volume of shipments to depots along these rivers was determined from a study of the status and growth of cargo shipments on small rivers; from forecasts of the total cargo requirements for the large-scale development and exploitation of the oil and gas deposits in Western Siberia; and from the findings of Sibgiproryechtrans [Siberian State Planning and Surveying Institute of the State Industrial Committee for River Transportation Construction of the USSR] on cargo shipments within the Ob-Irtysh Basin, including both intrabasin and local shipments.

Our calculations indicate that by 1985 shipments of dry cargo on the Nadym, Pur and Taz Rivers will be almost double those for 1980.

The opening of the Surgut-Urengoy Railroad will alter dramatically the direction of cargo flow to depots along the northern small rivers. By 1985, large shipments of cargo will be dispatched to these depots from ports in central Irtysh.



Concurrent with the opening of the new transshipment ports in Urengoy and Labytnangi the structure of the cargo traffic also has altered dramatically. Analysis of calculations on operating and economic indicators based on trends in cargo traffic shows that the consignment of cargo from Salekhard and Labytnangi to depots on the Nadym, Pur and Taz Rivers will increase. At the same time, much of the cargo from Urengoy will be dispatched to depots along the Pur River; the remainder will be shipped to depots along the Taz River. Shipments from Omsk and Tobol'sk will decline sharply; in fact, shipments from these two ports to the Pur and Taz Rivers will occur rarely.

The handling of the growing volume of cargo shipments via the Nadym, Pur and Taz Rivers is now a vital task for river transportation. The accomplishment of this task is hindered by the short navigation season and the difficult operating conditions (on both inland and open waterways). Additionally, vessels are being assigned loads that are beyond their present capacity to carry.

Notwithstanding the fact that the river fleet recently has been replenished with new, modern ships (such as the type 326 and 1743 cargo vessels), the fleet still contains many obsolete vessels. Primarily, the latter units comprise the 1,000-ton carrying capacity lighters, type-942 barges, and type-Ch-800 tugs. Low tonnage vessels are not available, nor are type-M non-self-propelled vessels for handling open storage cargo.

The Novosibirsk Institute of Water Transport Engineers has investigated the operating and economic indicators for towed and non-self-propelled dry cargo vessels that deliver crushed rock, ferroconcrete items, machinery, equipment, and metal ware to depots on the Pur and Taz Rivers. Findings show that the optimum type M-vessels are the 2,500-ton carrying capacity non-self-propelled vessels with drafts of 2 meters, and the R-153 1,100-kW powered tug. The tug has been designated for operations in the Labytnangi-Pur Vekhi area, while the non-self-propelled vessel will operate in the Labytnangi-Urengoy (Tibeysale) area. Non-self-propelled vessels using the type-1741 pusher tugs operate in the Pur Vekhi-Urengoy area.

The introduction of these vessels not only will make it possible to cope with the growing volume of shipments on the Pur and Taz Rivers, but also to achieve excellent performance indicators for these vessels compared with existing ones: gross productivity will increase 90% and tonnage will increase 60%. Economic indicators also will improve: production costs for shipments will be cut almost in half, the relative adduced costs will decrease 60%, and profitability will rise. The economic benefits of introducing new towed and non-self-propelled vessels will amount to 4.5 million rubles based on operating costs and 8.5 million rubles based on adduced costs.

Right now existing types of vessels could be used for the handling of shipments from the port of Urengoy: the type-912 cargo vessel; type 1741,



911V, and R96 tugs; and type 942, 943, R92, R90, 944, and 183B non-self-propelled dry cargo vessels. Type-R25B 2000-ton carrying capacity cargo vessels are recommended for handling closed storage cargo as far as Nadym.

Improvements in cargo processing are vital to the management of the volume of shipments on the Nadym, Pur and Taz Rivers. Most of the incoming cargo depots in the northern part of Tyumenskaya Oblast is unloaded on to the piers of non-transportation ministry organizations. The acceleration of cargo deliveries will be enhanced by the further outfitting of piers with reloading machinery, the expansion of mooring footage, coordination of the operations of all transportation and non-transportation organizations that process vessels at delivery points, and the introduction of general purpose piers. Although ports are now being built in Nadym, Urengoy, Labyt-nangi and Sergino, these are not enough. New mechanized piers for processing vessels should be built in Tibey-sale, Tazovski, Gazsale, Krasnosel'kup, Tol'ka, Tarkosale, Podbaz, Samburg and other cargo handling depots.

Navigation conditions also must be improved, particularly by increasing the size of the waterways.

The restricted operating season on the waterways in Obskoye Zapolyar'ye downgrades the role of river transportation in contributing to the national economy and hinders the handling of the growing volume of cargo shipments. Measures for extending the navigation season consequently take on enormous significance. Operation of the ice-breaker Kapitan Plakhin within the Irtysh Steamship Company indicates that the use of ice-breakers of this type is hampered by their low draft. Ice-breakers require a displacement of no greater than 2.5 meters to operate within Obskoye Zapolyar'ye. Additionally, a Type-2060 attachment should be used to breakup the ice. As is known, the ice cover can be broken up using air cushioning. Therefore, the task of conducting research and design work on the application of these measures during the construction of ice-breakers rests on the shoulders of scientific research and design organizations. Research also must be carried out on the new types of shipping facilities -- barge carriers, Ro-Ro vessels, floating containers, bending units, and ships containing new types of propellers for operations in the shallow upper reaches of the rivers in Obskoye Zapolyar'ye.

The establishment of the necessary facilities for ship repairs within Obskoye Zapolyar'ye is extremely important. For the long-term, construction of a ship repair yard should be considered. Over the short-term, repair ships should be assigned.

Preparation of a river transportation materials and equipment base in support of shipments of the growing volume of cargo along the Nadym, Pur and Taz Rivers demands constant careful attention.

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## OCEAN AND RIVER

### REGULATING NEW SHIP PRICES

Moscow RECHNOY TRANSPORT in Russian No 9, Sep 81 pp 26-27

[Article by M. Vul'fson, candidate of economic sciences, Central Water Transport Research Institute: "Regulating the Price of New Ships"]

[Text] A predominant amount of the fixed production capital of operational enterprises is earmarked for the fleet. During the 11th Five-Year Plan, the fleet is being replenished with large cargo carrying capacity vessels, mixed "inland and open sea" vessels, push tugs, barges for oversized shipments, ice-breakers, and passenger liners. The expanded composition of the ship inventory is having a decisive influence on the economic indicators of river transportation in terms of cost.

Analysis shows that the increased value of fixed production capital is related not only to the quantitative replenishment of the fleet but also in a significant way to construction costs; which, in turn, clearly affect the magnitude of amortization deductions and shipping costs. Between 1976 and 1980, total amortization deductions increased by 70 million rubles. Of this amount, 35 million rubles resulted from increases in the value of fixed production capital. The proportion of amortization deductions within shipping costs, consequently, has increased more significantly than other expenditure line items (see the following table).

Year	Production Cost for Shipping (Kopecks/10 ton-kilometers)			Increase in Production Cost (Percent)		
	Total	Amortization Deduction	Other Expendi- tures	Total	Amortization Deduction	Other Expendi- tures
1975	2.705	0.735	1.97	100	100	100
1980	3.066	0.971	2.095	113.3	132.1	106.3

Amortization deductions that are planned for the initial values of fixed production capital are a primary source of financing for the renewal of the fleet. Nevertheless, although amortization capital is increasing in

proportion to the higher value of ships, it apparently is inadequate for providing for the reproduction of fixed capital within the carrying capacity of the existing merchant fleet. For example, the proportionate cost of new 1472-kW (2000 hp) push boats is almost double that for recent construction 986-kW (1340 hp) push boats. The proportionate cost of 1-ton carrying capacity Volgo Don and Sormovskiy type cargo vessels is 1.5 times greater than that for design type 576 cargo vessels.

The increased cost of vessels generally can be explained by the fact that the newer ones are better engineered and fitted out. Shortcomings in existing methods for setting the price of vessels, which leads to increases in shipping costs, also must be taken into account.

The price of vessels essentially is established on the basis of individual production costs and the corresponding conditions for the organization of labor and the technological processes for ship construction within each individual shipyard. This arrangement results in a wholesale price that is dependent on which technology and what time frame are required before a shipyard masters the construction process for a particular vessel type, on whether the yard has sufficient load capacity to reduce overhead expenses, as well as on other characteristics of ship building. This pricing arrangement guarantees the profitability of shipyards even though shipping costs increase within the shipping agencies.

A fundamental principal for the introduction of new technology is that the user should receive economic benefits from its application in the form of increased profits that stem from decreases in production costs.

The prevalent methodology for determining the economic value of building ships suggests that the economic benefit to the user from the introduction of new vessels is expressed in a rise in profits and heightened profitability.

As is known, the economic benefits from new technology are achieved both during the development of the technology and during its actual application. Against the background of a continuous launching of new vessels, shipping costs, a basic indicator of the effectiveness of the merchant fleet, failed to attain the level at which the increased amortization reductions were compensated for during the Ninth Five-Year Plan. This circumstance is explained not only by the unsatisfactory use of the engineering advances introduced in the new ships, but also the inadequate use of the technical and economically based methods for the effective operation of the new ships and the setting of wholesale prices for their construction.

The setting of limiting costs for production machinery and equipment is one of the principles in price formation for machine building. This process allows price formation to be continuous, since it has already begun during the design stage; it gives customers an opportunity to elucidate their specific requirements in relation to the economic benefits of the new

technology; and serves as an approximation for planning and design organizations during the evaluation of the effectiveness of their decisions on project designs.

The cost of a class of vessels should not exceed the limiting costs. In reality, however, the costs are increasing because of supplementary wage costs and appreciation of equipment. Thus, supplementary payments of 330,000, 89,000, and then 136,000 rubles were added to the wholesale price of 1.66 million rubles for a 3,000-ton cargo carrying capacity vessel. The size of the supplementary payments has increased for almost all of the succeeding vessels in the class. For cargo vessels of the same class that were constructed at other shipyards, 293,000 rubles were added to the wholesale price of 1.96 million rubles for some ships and 315,000 rubles were added for other vessels, followed by an additional 47,000 rubles. The wholesale price (1.41 million rubles) for a 5,000-ton cargo carrying capacity ship was initially increased by 181,200 rubles and then an additional 34,000 rubles; while corresponding increases for ships built the following year were 215,200, 54,000, and 34,800 rubles. At one shipyard that built a 2,100-ton cargo carrying capacity vessel, payments added to the wholesale price of 1.62 million rubles amounted to 134,500, 76,000, and 30,000 rubles. Similar examples could be presented for each shipyard and ship type.

In view of the enumerable amount of supplementary work that is carried out on almost all of the ships constructed after the class prototype, it is usually difficult to determine which work should be considered to be a part of series production in terms of cost.

The increased costs for series production conflict with existing instructional directives of the State Planning Committee and the State Committee on Prices, which specify that the fixed wholesale price for series production ships should take into account the cost of supplementary work and delivery. This procedure is provided for in the existing methodology for determining the economic efficiency of ship construction when the economic benefits and the limiting cost for a series produced vessel are calculated using the proportion of supplementary expenditures for the class prototype and the initial series cargo ships based on the planned total number of ships in the series. However, this procedure is not adhered to within the ship building industry.

Several types of wholesale prices for ship construction are available: preliminary (approximate) and fixed for class prototype and series-produced cargo vessels.

Analysis of fluctuations in the cost of vessels shows that the costs of prototype ships are 40 to 80% higher than those of the series-produced ships. Thus, a price of 1.8 million rubles was set for the type R153 1104 kW (1500 hp) push boat, while the series vessels in this class cost 1.26 million rubles. Corresponding costs for the type R131 589 kW



(800 hp) push boat, the R79 3750-ton cargo carrying capacity barge section and the R85 2500-ton cargo carrying capacity barge are 677,000 and 416,000, 752,000 and 410,000, and 330,000 and 190,000 rubles, respectively. Consequently, the expenditures associated with the construction of the prototype and the initial series ships are borne by those shipping companies which receive them. As a result, cargo vessels of like carrying capacity that are owned by different shipping companies sometimes have the very same variable balanced cost, which produces a variable effect on the levels of shipping costs and profitability and weakens the motivation to use cost accounting when determining the economic impact of productivity.

The construction of new type ships requires increased expenditures on experimental design operations and training for and mastering of the production process. Improvements in production technology, the expansion of series production, and reduction in labor intensiveness enhance labor productivity and lower the cost of ship construction. Financing of the increased costs of the starting up and refining of production of new items through resources from the fund for exploiting new technology has been adopted within industry in general, while a percentage of the supplementary expenditures for the prototype and the initial multiple production items is included in the price of the multiple output. Similar procedures were introduced in the ship building industry in 1968. For example, expenses for the design, tests, and other operations in setting up the production of merchant and inland vessels costing up to 30 million rubles had to be recovered from the fund for exploiting new technology. This situation has spread not only to enterprises of the Ministry of the River Fleet, but also to the ministries of the maritime fleet, the ship building industry, and the fish industry.

Decisions on construction and technology that are adopted during the design stage are tested during the construction of the prototype ship. Cargo vessels that are constructed in accordance with a single design plan, but at a different yard are considered to be series vessels; therefore, a unified cost should be established for them. Nevertheless, varying wholesale prices are being approved for ships that are built at more than one shipyard. This applies to the construction of the Type-1557 cargo vessel, the R45B and 911V pusher tugs, and the R79 barge section. During this process, the 220 kW (300 hp) pusher tug has been built at nine shipyards.

In accordance with the 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers: "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality," the ministries decided to establish a unified fund for the development of science and technology, which would finance the increased expenditures for the starting up and refining of new types of products, for their testing and application, as well as for the increased expenditures during the first and second years of multiple production.

The application of this unified fund within the ship-building industry could alter significantly the principles for determining the construction costs of vessels. In view of the fact that until 1979 the expenditures for the organization of the production and building of ships were accounted for from the fund for developing new technology (which was formed through deductions from the production costs), the financing of the cited expenditures through the unified fund for the development of science and technology would not be reflected in the production costs, since this fund is formed from profits. Additionally, the instructions for using the unified fund would provide for limitations in the amount of supplementary work and would restrict such work based on the cost effectiveness of operating the new ships.

Objections to this approach are rooted in the fact that under the current instructions for constructing new ships all increased expenditures are covered by capital investments. However, this procedure fails to take into account the fact that the balanced value of vessels is increasing meanwhile, in the sense that the continuing increase in the value of ships is reflected in the mounting total from one year to the next, while the amortization rate, which is calculated independently from the level of depreciation of a ship, is also rising.

In this regard and in accordance with the 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers, new procedures are being introduced for the planning of capital investments based on standardized ratios of expenditures within the planned volume of production. Since the accepted standards for proportionate expenditures within the fleet do not account for the steady rise in the price of ships, the planned limit on capital investments does not allow for the financing of the growth in the fleet that has been mentioned.

The decisions of the 26th CPSU Congress mandate the full-scale development or strengthening of cost accounting, particular attention to lowering production costs, and the marked upgrading of the importance of this indicator in the evaluation of the performance of enterprises and associations. In the light of these decisions, the regulating of prices for new ships is becoming paramount within river transportation.

Reduction in the cost of new cargo vessels are factor not only of price regulation, but to a large degree, are also related to improvements in ship construction technology, the use of new construction materials, and the introduction of progressive norms and standards for expenditures on materials and labor. Using a solid cost effective base, problems must be solved relating to the design of new ships, organizing their series production, distributing orders for new ships among production enterprises and manufacturers, and curtailing the practice of constructing cargo vessels of one particular design at several different shipyards, which inflates constructions costs because of the large expenses incurred in mastering the construction process in each yard. Price regulation of new ships is a vital lever in refining the organization of production and enhancing the effectiveness of ship design and construction.

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# MISCELLANEOUS

## URENGOY-PETROVSK PIPELINE CONSTRUCTION PROGRESS

As of 6 July 1981

Moscow STROITEL'NAYA GAZETA in Russian 7 Aug 81 p 2

[Unattributed Article]

[Text] Table 1. Key Construction Project Calendar (Work Progress as of 6 July, in Kilometers)

Subunit	Task by the End of the Construc- tion Project	Inverted Welding		Insulation, Laying	
		Done	Remaining	Done	Remaining
Glavsibtruboprovodstroy	854	474	380	421	433
Glavvostoktruboprovodstroy	1115	579	536	440	675
Glavtruboprovodstroy	462	286	176	106	356
Glavukrneftegazstroy	194	105	89	53	141
Soyuzintergazstroy	101	72	29	46	55
Mingazprom	5	Crossing over the Kuybyshev Reservoir			
Total	2731	1516	1210	1066	1660

Discussion of the Data--The gas pipeline construction tempo has, on the whole, increased. At the end of July and beginning of August 14-15 kilometers of pipeline have been insulated and laid in a trench on individual days. The groups of the leading sectors--the Siberian trusts Urengoytruboprovodstroy/Urengoy Pipeline Construction Trust, Severtruboprovodstroy/Northern Pipeline Construction Trust, Priob'truboprovodstroy/Ob Pipeline Construction Trust are reorganizing their activities. They traditionally carry out line work mainly in the winter-time. Now they must carry it out all year. The collectives of Glavvostoktruboprovodstroy/Main Administration for the Construction of Pipelines in the



Key:

1. Urengoy
2. Punga
3. Kungur
4. Perm'
5. Kuybyshev
6. Tol'yatti
7. Syzran'
8. Petrovsk
9. Saratov

Eastern Areas have not gotten into the prescribed tempo. In spite of a noticeable increase in the daily pace by the production groups of Glavtruboprovodstroy [Main Administration for Pipeline Construction], they have permitted a large gap between individual types of work. The collectives of Glavukr neftegazstroy [Main Administration for Oil and Gas Industry Construction in the Ukraine] are working below their potential. While their neighbor--the production group of Soyuzintergazstroy [Association of International Gas Industry Construction]--insulated and laid 35 kilometers of pipeline in July; here they did only 20.

In order to successfully fulfill the commitment made for the ahead-of-schedule introduction into operation of the line part of the gas pipeline, the route workers must advance to a pace of laying and insulating 17-20 kilometers of pipeline per day.

The builders have serious complaints against some of the suppliers of mechanisms. They have obtained 11 TG-502 pipelayers, costing 245,000 (rubles) each, from the Sterlitamakskiy Building Machine Plant but these machines have not worked for one day because of various plant defects. Appeals by the chief administration to the supplier plant are not yielding any results.



As of 24 August 1981

Moscow STROITEL'NAYA GAZETA in Russian 26 Aug 81 p 1

Text Table 1. Key Construction Project Calendar (Work Progress as of 24 August, in Kilometers)

Subunit	Task by the End of the Construc- tion Project	Inverted Welding		Insulation, Laying	
		Done	Remaining	Done	Remaining
Glavsibtruboprovod- stroy	854	485	369	438	416
Glavvostoktrubopro- vodstroy	1115	670	445	525	590
Glavtruboprovod- stroy	462	345	117	149	313
Soyuzintergazstroy	101	88	13	68	33
Glavukrneftegaz- stroy	194	113	81	72	122
Mingazprom	5	Crossing over the Kuybyshev Reservoir			
<hr/>					
Total	2731	1701	1025	1252	1474 km

Discussion of the Data--The past week of 18-25 August has been characterized by a further growth in the tempo of line work and the gradual putting into operation of individual sectors of the mainline. Thus, in the activity zone of Glavsibtruboprovodstroy/Main Administration for the Construction of Pipelines in Siberian Areas, the production groups have begun to operate another 40 kilometers of gas pipeline. The total length of such sections is now almost 200 kilometers. Nevertheless, the tempo for turning over the completed product has not been sustained in the subunits of the chief administration. The Siberians must pay special attention to the final types of work (recultivation of the land, electrochemical protection, etc.) and must hand over all of the planned 285 kilometers of mainline to the customer by the end of the month for transporting gas to the consumers.

Some groups and Glavvostoktruboprovodstroy as a whole are not carrying out the tasks specified by the schedules. The construction of LEP/electric power transmission lines along the route is going slowly. The shortage of excavating equipment, pipe carriers, and tractors is being felt.

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## MISCELLANEOUS

### CONSTRUCTION OF GAS PIPELINES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 81 pp 5-6

[Article by A. K. Dertsakyan of Minneftegazstroy and I. P. Novikov of NIPIESUnef-tegazstroy: "Criteria for Selecting the Optimum Routes for Transporting Siberian Gas"]

[Text] The main source of growth in gas extraction over the next few years will be the deposits in the northern part of the Tyumenskaya Oblast. The primary consumers will remain as before the industrial center and large cities of the western and central regions of the country. Thus, the routes for the transportation of gas flows have been predestined to be from the north to the southwest, at a route length of 3,000-4,000 kilometers, with some deviations on one side or the other of a straight aerial line. Economic and geological-geographic factors, the equipping of construction organizations with large highly-mobile equipment, and other things influence and will influence the route deviation.

By what routes is it the most advisable, from a national economic point of view, to transport Tyumen' gas into the central regions?

Three main routes have been established during the past 15 years to transport gas from the SRTO/northern regions of the Tyumen' Oblast/: the northern, through Punga, Ukhta, Torzhok, Minsk; central, through Punga, Nizhnyaya Tura, Perm'; and the southern, through Tyumen', Chelyabinsk, Petrovsk, Novopskov.

Each of the routes indicated has been called upon to optimally connect the source of fuel power resources with the customer. Construction conditions, actual construction installation work, its tempo and quality, the necessity and number of equipment re-basings, etc., must also be taken into account.

The main factors which ought to be considered during a comparative assessment of two or several gas pipeline routes are the engineering-geological and climatic conditions, the economic and geographical conditions of the region through which the gas pipeline passes, and the technical and economic indicators for gas transportation.

The stratification of the terrain is considered when examining the engineering-geological conditions of construction. The ratio of the maximum absolute height of the route sector to its minimum size and the length of the river valleys and ravines in relation to the total area of the examined sector are determined by survey data.

The climatic construction conditions are the outside air temperature, the presence of permafrost soil, and the amount of atmospheric precipitation and snow cover. It is also necessary to consider the average wind speeds in the different seasons, and also the maximum snow movement during winter by wind directions.

The mobility of construction equipment in various construction seasons, the workability of mineral soils, the level of ground waters considering their seasonal fluctuations, swampiness, and a number of other factors are of major importance.

The length of route sectors, parallel to motor vehicle roads and railroads and passing along navigable rivers, belong to the economic and geographic construction conditions. One should also take into account the number of large trans-shipment points and transportation centers relative to the length of the sector.

The extent of the agricultural areas destined for re-cultivation, and the demographic features of the administrative region which crosses the gas pipeline route are of great importance; population density and the overall construction work force supply are related to these features.

It is necessary to evaluate the mobility and operational potential of construction equipment according to the technical characteristics of the basic fleet of construction machines and mechanisms and the maximum permissible loads on natural consistency soils depending, in turn, on seasonal moisture.

Analyzing the work fitness indicators of the machinery and mechanisms jointly with ground water level dynamics, one can distinguish the contours of water-logged ground on special large-scale construction condition maps.

The total water-loggedness in the northern part of the forest zone of the European part of the USSR is an impediment for a period up to three months in both the fall and spring and rules out the movement of construction equipment. On the central and southern routes construction periods are limited only for the spring slush time (not more than one month) because of the high stratification of the relief, the satisfactory filtration properties of the soil and the lower water-loggedness of the land.

The length of the construction season is limited by the process of the freezing of the swamps whose total area for the northern route is ten percent and higher than for the central and southern routes.

The workability of soft and liquid plastic soils, developed mainly on the northern route, is lower compared with the workability of these soils on the central and southern routes. The stickiness of the soil plays an important role. The lake-glacial clays and loams of the Mologo-Sheksninskoye inter-river area have the largest amount of stickiness on the northern Tyumen' gas transportation route. The chernozem soils of the forest-steppe and steppe zones, having stickiness only in the spring and fall slush periods, will be worse for the central and southern routes.

Table 1. General Coefficients Characterizing the Construction Conditions of the SRTO-Center Gas Pipeline

Route Sectors	Coefficients		
	Construction Price Rises	Growth in Labor Costs*	Decrease in Usable Work Time**
Urengoy-Punga, Urengoy-Tyumen'	1.62	1.2	4.4
Punga-Ukhta	1.20	1.3	2.1
Punga-Nizhnyaya Tura	1.10	1.3	1.8
Ukhta-Torzhok	1.30	1.4	1.7
Nizhnyaya Tura-Perm', Tyumen'-Chelyabinsk	1.25	1.1	1.5
Perm'-Tsentr	1.05	1.0	1.3
Chelyabinsk-Petrovsk-Novopskov	1.00	1.0	1.2
Torzhok-Minsk	1.15	1.3	1.0

\* according to construction conditions

\*\* according to meteorological conditions

The increased stickiness of mineral soils and the general peatiness of the land make it impossible to use the highly efficient rotary bucket excavators.

Quicksands, found in the fine-grained sands of water-glacial origin, which are widespread on the lines of the northern route, also decrease the tempo of the earthwork. The covering sandy loams in the northern European part of the USSR and in Western Siberia have high thixotropic properties. The softening of these soils under dynamic loads has been caused by its conversion into a sticky plastic condition and then into a viscous friction liquid state. As a result the use of construction machinery and mechanisms is hampered. The supporting power of the soils can be disrupted simply by running the engines, without even moving the equipment.

The two routes of the Urengoy-Western USSR border gas pipelines have been analyzed beginning with the construction conditions which show a substantial influence on the formation of cost indicators. The table presents regional coefficients reflecting the change in base norms depending on the line varieties. A sector of line in weakly-broken terrain produced by category I and II soils in the central regions of the European part of the USSR has been taken as the base.



The growth in labor costs on the northern line has been caused by the increased labor-intensiveness of all technological operations due to more complex natural and climatic conditions. Therefore yearly construction on the sector to the west of Gryazovets is 30 kilometers. This indicator is significantly higher on the central route. It reaches 80 kilometers a year on the sector to the west of Perm'. According to the calculations of specialists, the gas pipeline along the central route can be built a year earlier than the northern one.

The decrease in construction time periods by the efficient utilization of manpower and material resources at the disposal of Minneftegazstroy/Ministry of Construction of Petroleum and Gas Industry Enterprises/ permits us to obtain a significant national economic result.

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## MISCELLANEOUS

### TWENTY-SEVENTH ANTARCTIC EXPEDITION UNDER WAY

#### Contingent Departs for Antarctic

Moscow PRAVDA in Russian 2 Nov 81 p 1

[Article by TASS: "To Antarctica's Shores"]

[Text] Leningrad, 1 [Nov]. (TASS). Participants of the seasonal detachment of the 27th Soviet Antarctic Expedition will study and place on the map territory that is equal to that of several European states. Today about 200 scientists and specialists--geologists, geophysicists, geodesists and glaciologists--set sail for the shores of the sixth continent aboard the diesel-electric ship, "Vasiliy Fedoseyev."

A course was laid out on the navigators' maps for the antarctic Welland Sea, where the Druzhnaya, Druzhnaya-2, Shel'f and Geolog seasonal bases have been organized on the coastal shelf of the Lambert Glacier. The expedition has at its disposal airplanes and snowbuggies on which the scientists will make aerial and ground trips to mountain systems in the continent's depths, which are difficult of access. In particular, aboard an Il-14 flying laboratory, they will conduct geophysical research of Pensacola Mountain and the Shackleton mountain range.

GDR geologists are taking part in the expedition with Soviet specialists.

#### Il-18D Flies Via Africa

Moscow IZVESTIYA in Russian 3 Nov 81 p 6

[Article by V. Zakhar'ko: "By Air to the Antarctic"]

[Text] On 2 November the Il-18D passenger airplane with No 74267 on red wings took off from Leningrad for the Antarctic.

Having set a course for Odessa, it will proceed farther, on the same route that it set for itself during an experimental journey in February 1980 and which it repeated in the winter of this year: Cairo-Aden-Maputo-Antarctica Station Molodezhnaya. Near the latter, the world's first airdrome based on a snow foundation, for accommodating heavy transport airplanes with wheeled chassis, was created and is operating successfully.

Aside from the crew, about 50 scientists, engineers and workers were aboard who will take part in the research of the 27th consecutive Soviet Antarctic Expedition. It is planned that they will arrive on the sixth continent on the Great October holiday. A large amount of mail and presents for the polar workers who have spent a severe winter in the Antarctic are in the airplane's baggage compartment.

Maputo, the capital of Mozambique, will be the plane's temporary base. This is the concrete airdrome closest to Molodezhnaya--it is more than 5,000 kilometers to there, more than 8 hours of flying over the stormy Southern Ocean, where there is not one point of land on the whole route to serve as a beacon for the crew. After the Il-18D delivers at Molodezhnaya its passengers from Leningrad, it will return to Maputo, where a second group of scientists and specialists who are being sent to Antarctica will arrive shortly from Moscow on a regular airliner flight. Here they will change planes and take off on the Il-18D for their place of work. Several days later a third group of researchers will be sent from Moscow to Mozambique.

In all, about 150 polar workers, for whom this is the best time of the year in Antarctica--it is summer, there is daylight around the clock, and the sun is just a bit warm--will complete the trip on three shuttle flights from Africa to the icy continent.

The air expedition is under the command of Vnukovo Production Association commander M. Miroshnichenko, who managed the flight to Antarctica in February of this year.

#### Ships Deliver Aircraft

Moscow VOZHDUSHNYY TRANSPORT in Russian 5 Nov 81 p 2

[Article by O. Khaustov, chief of staff of the flying subunit (Myachkovo Airport): "The Course Is for Antarctica"]

[Text] Personnel of the flying subunit of the 27th Soviet Antarctica Expedition have set out for the icy continent's shores from Odessa and Leningrad on the motor-ships "Bashkiria," "Vasiliy Fedoseyev" and "Pioner Estonii." The ships will also deliver Il-14 and An-2 airplanes and Mi-8 helicopters to Antarctica.

For a month the aviators underwent additional theoretical training. Aside from the traditional flight disciplines, they studied the physical-geography conditions of Antarctica and the peculiarities of aerial navigation and the operation of the aviation equipment under extreme conditions.

Pilots of the Myachkovo Aviation Enterprise are the backbone of the flying subunit. Specialists from Bryansk, Belgorod, Ryazan' and other aviation enterprises will work together with them. Ye. Kravchenko, who has been awarded the Labor Valor Emblem of the Komsomol Central Committee, is in charge of the subunit. This is his ninth Antarctic Expedition. Radio operator V. Astakhov is going to the Antarctic for the eighth time, deputy subunit commander Ye. Sklyarov for the fourth time.

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## MISCELLANEOUS

### TOL'YATTI-ODESSA AMMONIA PIPELINE PUT INTO OPERATION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Nov 81 p 1

[Article by B. L'vov: "The Fertility Arterial"]

[Text] A significant event has occurred near the city of Lozovaya, Khar'kovskaya Oblast: a stream of ammonia, after starting its journey on the Volga's shores, at the city of Tol'yatti, crossing the border of the Russian Federation and the Ukraine and traveling 1,600 kilometers, has joined with another stream, the source of which is at the Stirol' Association, close to the Donetskaya Oblast city of Gorlovka. Almost 2,500 kilometers of the unusual line are beginning now to affect the fertility front. Automated and remote-control instruments of the central control panel of the Tol'yatti-Gorlovka-Odessa ammonia pipeline have confirmed this.

Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] workers have done a large amount of construction and installing work. The pipeline-route workers in particular overcame a multitude of the most complicated natural and man-made obstacles, having built more than 100 crossings across rivers and about 220 across railroads and highways.

The guyed crossing of the Dnepr is truly a triumph of engineering thought. It is about 1 kilometer long. Twelve special wire ropes hold the bridge in place above the river bed. It was built in 7 months--twice as fast as had been planned. The brigades of USSR Distinguished Builder M. Sukharev and A. Gavrilov distinguished themselves during raising of the heavy 300-ton supports about 80 meters high. The arterial is packed in a sturdy holding jacket at the Dnepr aerial crossing.

The arterial's crossings over almost 40 rivers that are of special importance for ship navigation and fisheries are also distinguished by increased reliability and high effectiveness of the means for protecting the environment. At the underwater crossings in particular, a packing-gland seal of special design that provides a high degree of tightness was used.

This is the first such arterial built in our country, and it is the largest in Europe. Because of the especially high demands for reliability and safety, the arterial was divided into sections by means of shutoff fixtures. Telemetric and automatic monitoring of the pumping parameters from a central dispatcher's control



panel enables not only management of the process over the entire length of the route but also instant switching off of a section that breaks down.

Erection of the ammonia pipeline shows that our country has successfully mastered a new type of pipeline construction--pipelines for the long-distance transport of chemical products. No few technological innovations and progressive methods for welding pipe were used on the line, and superprecise erection and tuneup of the line's automatic components, pump stations and communications points, as well as of protective installations that reliably guard the environment at the slightest leak of product, were carried out.

Collectives of designers of GIAP [State Scientific-Research and Design Institute for the Nitrogen Industry and Products of Organic Synthesis], Giprotuboprovod [State Institute for the Design of Trunk Pipelines] and Giprosvyaz' [State Institute for the Survey and Design of Communications Structures], as well as more than 20 other design organizations that developed documents for electrical supply, the installation of surface and underwater crossings, the building of highways, and so on, together with builders of the trusts Mosgazprovodstroy, Bryansktruboprovodstroy, Voronezhtruboprovodstroy, Lenzgazspetsstroy, Shchekingazstroy and of the Soyuznitergazstroy Association and a number of other organizations, passed an important production test.

The route of almost 2,500 kilometers that was put into operation on the eve of the 64th anniversary of the Great October has been called upon to raise sharply the effectiveness of the Ukraine's and the Russian Federation's agriculture. Thirty distributing centers that were designed to deliver a hundred tons of ammonia per day will send most valuable nitrogenous fertilizer directly to the fields of Kuybyshevskaya, Saratovskaya, Voronezhskaya, Tambovskaya, Belgorodskaya, Khar'kovskaya, Dnepropetrovskaya, Nikolayevskaya, Khersonskaya and Odesskaya oblasts.

But this will not exhaust the national economic benefit of the new line. With its introduction, tens of thousands of railroad tank cars will be released.

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